

**UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION**

DIFF SCALE OPERATION RESEARCH, LLC,

Plaintiff,

v.

CALIX, INC.,

Defendant.

Civil Action No. _____

JURY TRIAL DEMANDED

COMPLAINT FOR PATENT INFRINGEMENT

DIFF Scale Operation Research, LLC (“Plaintiff”), by its undersigned counsel, bring this action and make the following allegations of patent infringement relating to U.S. Patent Nos.: 6,407,983 (the, “‘983 patent”); 6,940,810 (the, “‘810 patent”); 6,847,609 (the, “‘609 patent”); 6,990,110 (the, “‘110 patent”); 7,239,627 (the, “‘627 patent”); 6,216,166 (the, “‘166 patent”); 6,233,221 (the, “‘221 patent”); 7,170,894 (the, “‘894 patent”); and 6,859,430 (the, “‘430 patent”) (collectively, the “patents-in-suit”). Defendant Calix, Inc. (“Calix” or “Defendant”) infringes each of the patents-in-suit in violation of the patent laws of the United States of America, 35 U.S.C. § 1 *et seq.*

INTRODUCTION

1. This case arises from Calix’s infringement of a portfolio of semiconductor and network infrastructure patents. This patent portfolio arose from the groundbreaking work of ADC Telecommunications, Inc. (“ADC Telecommunications”).

2. In 1935, ADC Telecommunications, then known as the Audio Development Company¹ was founded in Minneapolis, Minnesota by two Bell Laboratory engineers to create custom transformers and amplifiers for the broadcast radio industry. In the 1950s, ADC Telecommunications began to produce jacks, plugs, patch cords, and jack fields, which would be cornerstones for ADC Telecommunications' later entry into telecommunications equipment.²

3. In the late 1990s, ADC Telecommunications pioneered the development of microchips and network switches for the burgeoning telecommunications industry.³ ADC Telecommunications' products included fiber-optic video, data, and voice transmission systems, and its clients included all the major domestic cable TV operators, numerous phone companies, and a majority of TV broadcasters.⁴

4. Prior licensing of ADC Telecommunications' patents confirms the significant value of ADC Telecommunications' innovations. In 2011, HTC the Taiwan based smartphone manufacturer, bought a portfolio of 82 patents and 14 pending applications related to mobile technology from ADC Telecommunications.⁵ HTC asserted two of these patents against Apple before the International Trade Commission.

¹ Audio Development Company was later renamed ADC Telecommunications, Inc. *U.S. Senate Executive Reports*, U.S. PRINTING OFFICE at 39 (1999) ("The story of ADC Telecommunications begins in 1935, the height of the great depression The company got its start with a new innovation called the audiometer, an electronic device designed to test hearing.").

² *High Fidelity Audio Devices Boost Capitol Diskery Sales*, BILLBOARD MAGAZINE at 12 (August 8, 1950) (describing Audio Development Company's amplifiers).

³ David Beal, *Seeing the Light; ADC Telecommunications Has Grown From Making Telephone Jacks And Plugs Into A Force For The Global Fiber-Optic Future*, ST. PAUL PIONEER PRESS at E1 (December 25, 1995).

⁴ George Lawton, *Fiber Optic Architecture Evolution Evident at Cable-TV Exhibition*, LIGHTWAVE MAGAZINE (August 1, 1995) ("Cable-Tec Expo's exhibition area featured new fiber-optic products and technologies for the optical-fiber and cable-TV industries. For example, Minneapolis-based ADC Telecommunications Inc.")

⁵ *HTC Buys Patents from ADC Telecommunications for \$75 million*, THE NATIONAL LAW REVIEW (April 19, 2011), available at: <https://www.natlawreview.com/article/htc-buys-patents->

Apple Inc. may face a difficult task invalidating two HTC Corp. patents for data transmission in wireless devices, a U.S. Trade Judge said at a trial that could lead to import bans on the newest iPad and the next version of the iPhone. . . In this case, though, HTC acquired the patents at issue in April 2011, around the same time it began selling its first LTE phone, the Thunderbolt. ***The patents are part of a portfolio HTC bought for \$75 million from ADC Telecommunications Inc.*** [Judge] Pender told McKeon. “They are a property right.”

Susan Decker, *HTC Patents Challenged by Apple Probably Valid, Judge Says*, BLOOMBERG NEWS (September 7, 2012) (emphasis added).

5. HTC’s assertion of two patents acquired from ADC Telecommunications was described by commentators as forcing Apple to the negotiating table following a series of lawsuits between Apple and HTC:

A separate case before the ITC may have ***forced Mr. Cook to the negotiating table*** after a judge at the agency said Apple would be likely to face difficulty getting a series of HTC patents invalidated. ***HTC bought those patents, which covered technology used in LTE high-speed wireless devices, from ADC Telecommunications for US \$75 million.*** “The settlement is a big surprise and is likely due to HTC’s LTE patents, which is bought from ADC last year, as Apple’s LTE patents are relatively weak,” said Jeff Pu, an analyst from Fubon Financial Holding Co.

Apple Settles HTC Patent Suits, Signaling Shift from Jobs’ War Plan, FINANCIAL POST / BLOOMBERG NEWS (November 12, 2012) (emphasis added).

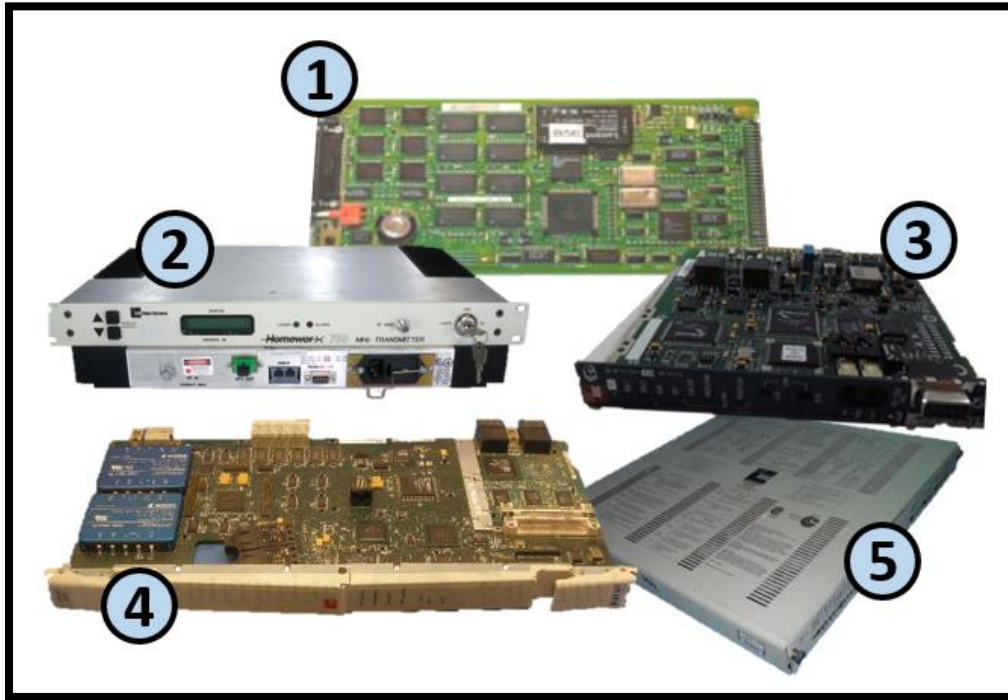
6. ADC Telecommunication’s revolutionary products included Homeworx Hybrid Fiber/Coax Access Platform (“ADC Homeworx”).⁶ ADC Homeworx was an integrated broadband transport system that could deliver video, telephony, data, and other services over a network of fiber optic and coaxial cables.⁷ The ADC Homeworx network utilized fiber-optic and radio

adc-telecommunications-75-million (“HTC, the Taiwan based smartphone manufacturer, has bought a portfolio of 82 patents and 14 pending applications related to mobile technology from US based ADC Telecommunications.”).

⁶ Sue Boyle, *Cable-Telephony Platform*, LIGHTWAVE MAGAZINE Vol. 17; No. 16 at 185 (September 1, 2000) (“The Homeworx cable-telephony system adds new features to the carrier-class hybrid fiber/coaxial telephony platform. The system offers improvements in flexibility, manageability, and robustness.”).

⁷ *Homeworx HFC Access Platform Outdoor ISU-32 Integrated Services Unit Installation Manual*, ADC Telecommunications Manual at 1-1 (July 1999).

frequency transmission technologies for transporting various services over a network.⁸ ADC Telecommunications' groundbreaking products also included: the Soneplex Platform, CityCell, Cellworx STN Service, the EZT1 Voice Multiplexer, FOLENS (Fiber Optic Local Exchange Network System), and the DS3 Fiber Loop Converter.⁹



ANNOTATED GRAPHIC OF SELECTED ADC TELECOMMUNICATIONS PRODUCTS (numbered annotations showing: (1) ADC Soneplex SPX MPU Board MC68302; (2) ADC Homeworx 750MHz XMTR; (3) ADC HiGain HDSL4 Remote Unit H4TUR402L53; (4) ADC Cellworx BA4IKKLBA; and (5) ADC Telecommunications EZT1 Access Multiplexer).

⁸ *ADC AT&T Bis Team for Cable Telephony*, CABLE WORLD MAGAZINE Vol. 11 at 28 (May 31, 1999) (“The company's Homeworx cable telephony platform has the largest capacity in the fledgling 6 MHz bandwidth channel compared to conventional telephone carriers.”).

⁹ *Modems, Test Gear, Return Path Hot at Expo*, CED MAGAZINE (June 30, 1997), available at: <https://www.cedmagazine.com/article/1997/06/modems-test-gear-return-path-hot-expo> (“ADC Telecommunications introduced a new forward path receiver that extends performance to 860 MHz for cable TV and telephony applications.”).

7. By 1999, ADC Telecommunications had almost 10,000 employees and annual sales of 1.5 billion dollars. Although ADC Telecommunications was a leading innovator in its field, it was a mid-sized company in a market dominated by multinational corporations.¹⁰

8. A 1999 New York Times article on the telecommunication industry foreshadowed the difficulties that ADC Telecommunications would face when competing against much larger competitors who were able to use their market power to dominate the market at the expense of smaller players:

Cisco's is not the only approach in the M.M.D.S. broad-band data market, however. The company's wireless competitors will include Spike Technologies, ADC Telecommunications and Adaptive Broadband. But *Cisco's prominence as an Internet technology vendor, along with the powerful alliance it has built, could give the company an inside edge*, some analysts said.

John Markoff, *Cisco to Offer More Details on Wireless Technology*, N.Y. TIMES a C-1 (November 29, 1999) (emphasis added).

9. In 2015, ADC Telecommunications (including its foundational intellectual property) were acquired by CommScope, Inc. ("CommScope"). CommScope, a spin-off of General Instrument Corporation, manufactures optical fiber cabling, multiplexers, and telecommunications antennas.

10. To facilitate the licensing of ADC Telecommunications' technology, CommScope assigned 73 patents and patent applications covering ADC Telecommunications' pioneering innovations relating to electronic circuits for timing and network traffic management to DIFF Scale Operation Research. DIFF Scale Operation Research protects and licenses ADC Telecommunications' inventions, which are widely adopted by leading technology companies.

¹⁰ Barnaby J. Feder, *Optical Fiber (Almost at Home)*, N.Y. TIMES at F-6 (March 24, 1991) ("AT&T's competitors range from giants like Alcatel of France and Fujitsu of Japan to mid-sized companies like ADC Telecommunications Inc.").

11. Highlighting the importance of the patents-in-suit is the fact that the patents-in-suit have been cited by over 600 U.S. Patents and Patent Applications by a wide variety of the largest companies operating in the field. For example, the patents-in-suit have been cited by companies such as:

- International Business Machines Corporation¹¹
- Apple, Inc.¹²
- Intel Corporation¹³
- Broadcom Corporation¹⁴
- Microsoft Corporation¹⁵
- Sony Corporation¹⁶
- Cisco Systems, Inc.¹⁷
- Hewlett-Packard Enterprise Company¹⁸
- Huawei Technologies Co., Ltd.¹⁹
- Alcatel-Lucent S.A.²⁰
- Fujitsu Ltd.²¹
- Panasonic Corporation²²
- Telefonaktiebolaget L.M. Ericsson²³
- NEC Corporation²⁴

¹¹ See, e.g., U.S. Patent Nos. 7,894,478; 8,270,296; 8,559,460; 7,398,326; 7,827,317; 7,321,648; and 7,746,777.

¹² See, e.g., U.S. Patent Nos. 9,026,680; 7,457,302; and 8,275,910.

¹³ See, e.g., U.S. Patent Nos. 7,248,246; 7,046,675; 7,263,557; 7,903,560; 8,233,506; 7,248,246; 6,507,915; 6,996,632; 7,346,099; and 7,673,073.

¹⁴ See, e.g., U.S. Patent Nos. 7,161,935; 7,203,227; 7,436,849; 7,724,661; 8,401,025; 8,411,705; 8,462,819; and 9,544,638.

¹⁵ See, e.g., U.S. Patent Nos. 7,526,677; 7,533,407; 7,793,096; 7,827,545; and 9,225,684.

¹⁶ See, e.g., U.S. Patent No. 8,200,873.

¹⁷ See, e.g., U.S. Patent Nos. 7,023,883; 7,523,185; 7,631,055; 7,653,924; 7,751,412; 8,144,591; 8,289,873; 8,379,648; and 8,811,281.

¹⁸ See, e.g., U.S. Patent Nos. 7,103,654; 7,187,674; 7,266,598; and 7,478,260.

¹⁹ See, e.g., U.S. Patent Nos. 7,664,051 and 7,916,758.

²⁰ See, e.g., U.S. Patent Nos. 6,798,741; 6,895,004; 7,209,530; 7,525,913; 7,536,716; 7,583,689; 7,602,701; and 8,379,509.

²¹ See, e.g., U.S. Patent Nos. 6,647,012; 7,330,057; 7,450,505; 7,469,298; and 7,664,217.

²² See, e.g., U.S. Patent Nos. 8,648,632 and 7,457,979.

²³ See, e.g., U.S. Patent Nos. 8,780,695 and 7,215,664.

²⁴ See, e.g., U.S. Patent Nos. 6,218,875; 6,707,823; 6,810,497; 6,885,676; and 7,486,663.

- Marvell Technology Group, Limited²⁵

THE PARTIES

DIFF SCALE OPERATION RESEARCH, LLC

12. DIFF Scale Operation Research, LLC (“DIFF Scale Operation Research”) is a limited liability company organized under the laws of Delaware. DIFF Scale Operation Research is committed to advancing the current state of electronic circuitry and network infrastructure.

13. Brooks Borchers, a former leader of research and development divisions at Boston Scientific Corporation, is the president and owner of DIFF Scale Operation Research, LLC.

14. In an effort to obtain compensation for ADC Telecommunications’ pioneering work in the fields of semiconductors, electronic circuitry, and network infrastructure, CommScope assigned the following patents and patent application to DIFF Scale Operation Research: U.S. Patents and Application Nos. 5,986,486; 6,008,734; 6,157,646; 6,216,166; 6,233,221; 6,363,073; 6,407,983; 6,433,988; 6,664,827; 6,721,328; 6,757,247; 6,847,609; 6,859,430; 6,940,810; 6,959,006; 6,980,565; 6,990,110; 7,106,758; 7,170,894; 7,239,627; 7,881,413; 8,121,455; US20010000071A1; US20020150108A1; US20020163886A1; US20020176411A1; US20020180498A1; US20020190764A1; US20030063625A1; US20030118033A1; US20070019686A1; US20100061686A1; US20100150515A1 and International Patents and Application Nos. AT519138T; AU199914551A; AU199923274A; AU199923353A; AU200134402A; AU2002309562A1; CA2442738A1; CA2447983A1; CA2447983C; CN1278969A; CN1289489A; CN1291414A; DE102007010863A1; DE102007010863B4; DE102007032186A1; DE202007008151U1; DK2132589T3; EP1031185A1; EP1050125A1; EP1057361A1; EP1386450A2; EP1386450A4; EP2132589A1; EP2132589B1; ES2368361T3;

²⁵ See, e.g., U.S. Patent Nos. 7,733,588; 7,737,793; and 7,944,313.

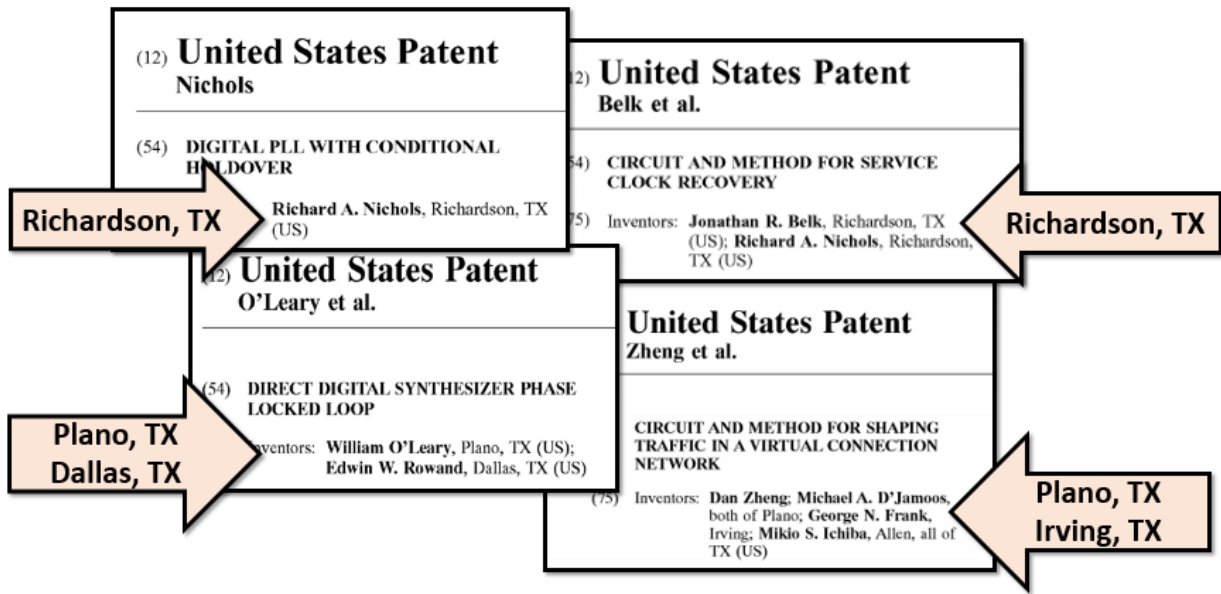
JP03811007B2; JP2001523059A; JP2002502146A; JP2002504793A; JP3811007B2;
WO1999025066A1; WO1999038285A1; WO1999043184A1; WO2001037468A2;
WO2001037468A3; WO2002084927A2; WO2002084927A3; WO2002101959A1;
WO2008104282A1; WO2008104284A1.²⁶

15. DIFF Scale Operation Research pursues the reasonable royalties owed for Calix's use of ADC Telecommunications' and CommScope's groundbreaking technology both here in the United States and throughout the world.

16. CommScope maintains 79,950 square feet of office space at 2601 Telecom Pkwy, Richardson, Texas. Over 200 CommScope employees are employed at its Richardson, Texas location. CommScope maintains off-site document storage at its Richardson, Texas office where hard-copy documents are stored, at least some of which are relevant to this case. CommScope also maintains a datacenter located in Richardson, Texas, where at least some information and software relating to the patents-in-suit in this action are stored. In addition, CommScope maintains a Wide Band Multimode Fiber testing facility in Richardson, Texas.

17. ADC Telecommunications had a significant presence in Richardson, Texas and many of the inventions disclosed in the ADC Telecommunications patent portfolio were made at its Richardson location. On information and belief, many of the named inventors of the ADC Telecommunications patent portfolio continue to be located in and in close proximity to the Eastern District of Texas.

²⁶ The patents were assigned to DIFF Scale Operation Research by CommScope DSL Systems, LLC and CommScope Technologies, LLC.



U.S. PATENT NOS. 7,881,413; 6,664,827; 7,106,758; 6,407,983 (annotations added) (showing the named inventors located in and in close proximity to the Eastern District of Texas).

CALIX, INC.

18. On information and belief, Calix, Inc. ("Calix"), is a Delaware corporation with its principal place of business at 1035 N. McDowell Blvd., Petaluma, California 94954. Calix may be served through its registered agent Corporation Service Company d/b/a CSC-Lawyers Incorporating Service Company, 211 E. 7th Street, Suite 620, Austin, Texas 78701. On information and belief, Calix is registered to do business in the State of Texas and has been since at least March 17, 2000.

19. On information and belief, Calix conducts business operations within the Eastern District of Texas and maintains a corporate office at 2350 Campbell Creek Blvd., Suite 100, Richardson, TX 75082.

JURISDICTION AND VENUE

20. This action arises under the patent laws of the United States, Title 35 of the United States Code. Accordingly, this Court has exclusive subject matter jurisdiction over this action under 28 U.S.C. §§ 1331 and 1338(a).

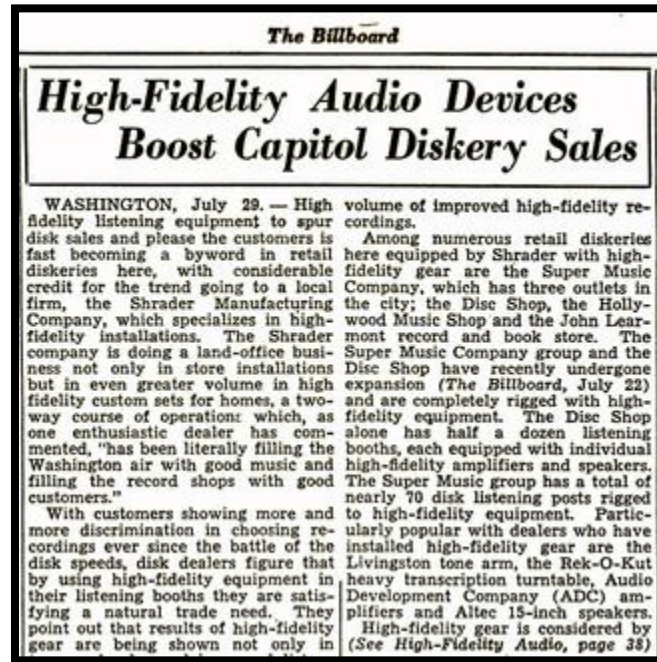
21. Upon information and belief, this Court has personal jurisdiction over Calix in this action because Calix has committed acts within the Eastern District of Texas giving rise to this action and has established minimum contacts with this forum such that the exercise of jurisdiction over Calix would not offend traditional notions of fair play and substantial justice. Defendant Calix, directly and/or through subsidiaries or intermediaries (including distributors, retailers, and others), has committed and continues to commit acts of infringement in this District by, among other things, offering to sell and selling products and/or services that infringe the patents-in-suit. Moreover, Calix is registered to do business in the State of Texas, has offices and facilities in the State of Texas, and actively directs its activities to customers located in the State of Texas.

22. Venue is proper in this district under 28 U.S.C. §§ 1391(b)-(d) and 1400(b). Defendant Calix is registered to do business in the State of Texas, has a corporate office in the State of Texas, and upon information and belief, has transacted business in the Eastern District of Texas and has committed acts of direct and indirect infringement in the Eastern District of Texas.

**ADC TELECOMMUNICATIONS LANDMARK SEMICONDUCTOR
AND NETWORKING TECHNOLOGIES**

23. In 1935, ADC Telecommunications, then known as the Audio Development Company was founded in Minneapolis, Minnesota by two Bell Laboratory engineers to create custom transformers and amplifiers for the radio broadcast industry. In 1941, while participating in a project to develop a sophisticated audio system for Coffman Union at the University of Minnesota, ADC Telecommunications began to produce jacks, plugs, patch cords, and jack fields,

which would be cornerstones for ADC Telecommunications' later entry into telecommunications equipment.²⁷



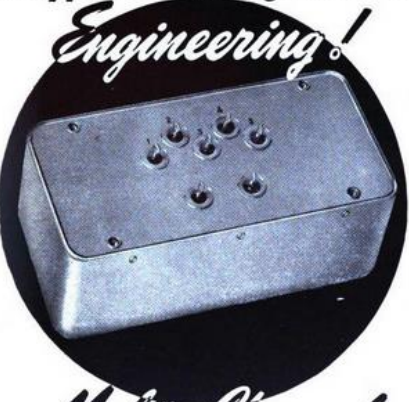
High Fidelity Audio Devices Boost Capitol Diskery Sales, BILLBOARD MAGAZINE at 12 (August 8, 1950) (describing Audio Development Company's amplifiers).

24. In 1961, ADC Telecommunications released the Bantam jack. This product was an amalgam of miniaturized components and became standard for telephone circuit access and patching.²⁸

²⁷ James F. Mauk, INDUSTRIAL RESEARCH LABORATORIES OF THE UNITED STATES at 47 (1947) (listing the research activities of the Audio Development Company as "high temperature electronic transformers; miniaturization of electronic transformers; high frequency electrical wave filters, encapsulation techniques; epoxies").

²⁸ Steven Titch, *ADC Unveils Loop Product Strategy*, TELEPHONY at 9 (February 24, 1992).

A Typical Challenge to ADC Engineering!



Multi-Channel NARROW BANDPASS FILTER UNITS

Like many of the problems brought to the Audio Development Company, this one involved a definite performance improvement with reductions in size and weight.

From an originally specified maximum weight of 40 oz. for gatted one-channel interstage filters, the weight of this ADC five-channel unit was reduced to less than 10 oz. per section, hermetically sealed. Volume was reduced by over 50%.

Electrical performance was improved to provide a midband gain of $14 \pm 1\frac{1}{2}$ db when the original specifications permitted a loss from 0 to 6 db. In addition, attenuation characteristics were improved to provide approximately 25 db discrimination at $1/3$ octave with bandpass $\pm 1\frac{1}{2}$ db over $\pm 3\%$ of mid-frequency.

These filters are available in single or multi-channel units for frequencies from 200 cps to supersonic and carrier range. Frequencies lower than 200 cps are available with some size increase. Units can also be supplied in combination with high or low pass

THREE-PHASE POWER (continued)

$$\left[\frac{a + \sqrt{b}}{2(2 + b\sqrt{3})} \right]^{1/2} + \frac{1 + b\sqrt{3}}{2(2 + b\sqrt{3})}$$

The $F = 1$ curve for the lead shifter

$$a = \left\{ \left[\frac{b\sqrt{b^2 + 1}}{4} \right] - \left[c + \frac{1}{4} \right] \right\}^{1/2} + \frac{b^2 + 2}{4}$$

The 120-degree curve for the lag shifter

$$a = (2 + (b + 2c)\sqrt{3} \pm \sqrt{(4 + 3b)^2 + 16c(b + c)})^{1/2}$$

The $F = 1$ curve for the lag shifter

$$a^2 - 4a^2 + a^2 (2c^2 + 2bc + b^2 + 4) + a(4c^2 + 4bc + 2b^2) = -[c^2 + 2bc + c^2(b^2 + 4) + 4bc]$$

For each value of b , the first two equations determine a design point for the shifter on an a - c plane. The

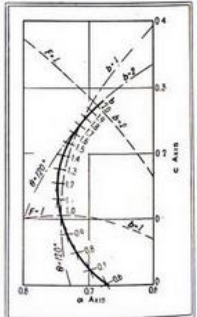


Fig. 2—Design curve for 120-degree lead shifter

A Typical Challenge To ADC Engineering, ELECTRONICS MAGAZINE Vol. 18 at 288 (August 1945) (describing one of the early innovations of ADC Telecommunications).

25. In the 1960s, ADC Telecommunications began an ongoing partnership with NASA's space missions, designing and manufacturing sensors for the Columbia space shuttle.

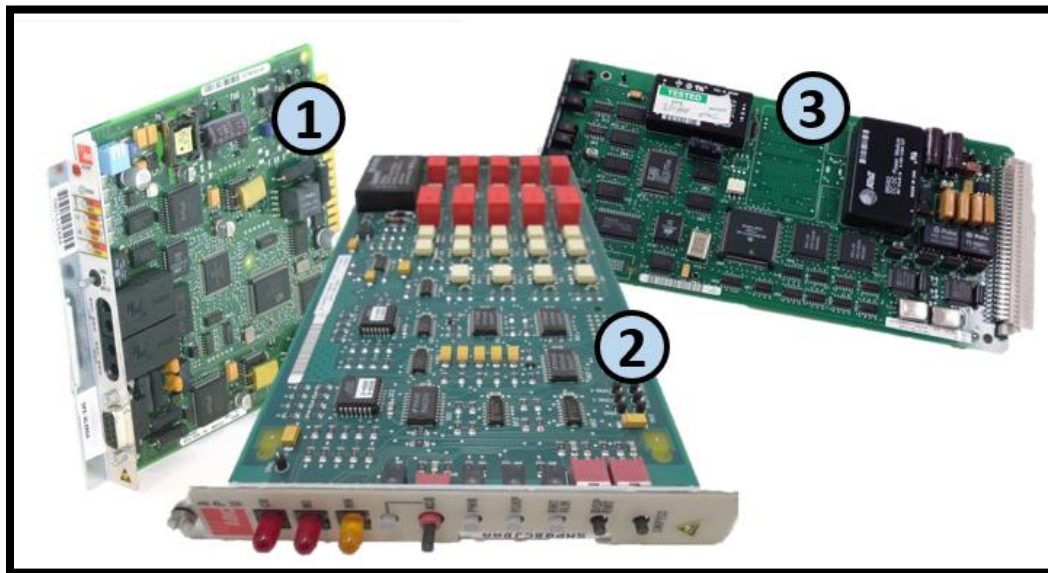
power supply board. The transceivers used are the CAF model manufactured by ADC Telecommunications, Inc.. The transceiver use bidirectional, full-duplex signal transmission over a single optic fiber. The transceiver is a self-contained, circuit-board-mountable device that contains the transmitting LED, the receiving photodetector, and the beam splitter. The transceivers are a matched pair which utilize two different light frequencies for receiving and transmitting. This configuration allows for full-duplex and bidirectional operation over a single fiber optic line. The optic fiber connects to the transceivers with SMA-type connectors.

R. L. Glassell et al., *Custom Electronic Subsystems For The Laboratory Telerobotic Manipulator*, PROCEEDINGS OF THE FOURTH ANS TOPICAL MEETING ON ROBOTICS AND REMOTE SYSTEMS at 151 (1991) (describing the work ADC Telecommunications was doing for NASA).

26. The 1970s and 1980s ushered in technological advancement in all areas of telecommunications and data processing. Public and private computer use increased, and telecommunications evolved into the computer age, with telephonic digital transmission and the

expansion of data communications. As a leading innovator in these fields, ADC Telecommunications grew dramatically. ADC Telecommunications entered the video services delivery market and was a leading supplier of fiber-optic video transmission equipment for cable operators.²⁹

27. In the 1990's ADC Telecommunications utilized its fiber-optics expertise to develop a local loop system with the goal of providing economical fiber directly to private homes. ADC Telecommunications also created Networkx, a novel transmission platform that integrated cable management and private networking products, using synchronous optical network and the asynchronous transfer mode (ATM). The cornerstone of Networkx was Sonoplex, a multi-rate, multimedia system that brought fiber to the customer's work or residence site, while making use of existing copper lines.



ANNOTATED GRAPHIC OF SELECTED ADC SONOPLEX TELECOMMUNICATIONS PRODUCTS (numbered annotations showing: (1) SPX-HLXRG4 Sonoplex HDSL Module; (2) ADC SPX-APU0B1 SONEPLEX ALM Processor Module; and (3) ADC SPX-RLX1B1 CARD.).

²⁹ Carol Wilson, *ADC Launches Fiber-Coax Platform*, TELEPHONY AT 11 (May 24, 1993).

28. In the 1990s, ADC Telecommunications partnered with South Central Bell, Mississippi Educational Television, Northern Telecom, IBM, and Apple Computer to create Fibernet, a network linking students at four high schools in Clarksville, Corinth, West Point, and Philadelphia, Mississippi, with teachers at Mississippi State University, Mississippi University for Women, and Mississippi School for Mathematics and Science to create "electronic classrooms."

29. ADC Telecommunications became an "early leader" in the asynchronous transfer mode (ATM) market, developing some of the first ATM switches. The ADC Telecommunications ATM switch enabled the handling the massive flows of simultaneous high-speed digital information that the industry projected would be generated during the latter half of the 1990s and into the 21st century, arising from the blending of the communications, computing, and entertainment industries. ADC Telecommunications also landed a coup in March 1994 when Ameritech chose ADC to supply equipment for its fiber-optic video system. This \$4.4 billion project would bring 70 channels of analog television and 40 channels of digital video to customers, with unlimited program choices and interactive, customer-controllable programming. By 1999, ADC Telecommunications employed 9,700 people and was selling \$1.5 billion dollars in communications equipment.

THE ASSERTED PATENTS

U.S. PATENT NO. 6,407,983

30. U.S. Patent No. 6,407,983 (the "983 patent") entitled, *Circuit and Method for Shaping Traffic in a Virtual Connection Network*, was filed on February 20, 1998. DIFF Scale Operation Research is the owner of all right, title, and interest in the '983 patent. A true and correct copy of the '983 patent is attached hereto as Exhibit A.

31. The '983 patent claims specific methods and systems for delivering data packets from a traffic source to a virtual connection at a uniform rate using a traffic shaper. For example, one or more of the '983 patent claims describe a system where a buffer receives packets from a traffic source (e.g., a server on a computer network that originates data packets). The claimed system utilizes a counter that indicates the beginning of each of a number of timeslots over a selectable time period. Further, the claimed system contains a request generator that creates request signals that request timeslots for transmitting data out of a buffer. The requests are distributed so that a desired data rate for the traffic source is established.

32. The '983 patent teaches a method and system for an improved traffic shaper. At the time the inventions disclosed in the '983 patent were conceived "conventional[] telecommunications services [had] been provided to subscribers using dedicated channels." '983 patent, col. 1:11-12.

33. In the late 1990's, conventional traffic shaping technology could not selectively allocate timeslots for data transmission in a measurement window. The '983 patent teaches specific solutions to the problem apparent in the technology at the time. For example, the '983 patent teaches the use of a request generator that generates requests during a specific time window. The request generator attempts to evenly distribute the requests over the duration of the window.

34. The '983 patent discloses additional improvements to the functioning of traffic shapers by teaching the delivery of data packets from at least one traffic source to a virtual connection network at a substantially uniform rate.

35. The '983 patent further teaches the use of generating requests for timeslots for data transmission according to a stored pattern based on a selected data rate.

36. Another insight for improving the performance of traffic shaping systems described by the '983 patent is to use a counter which can generate pulses that indicate the beginning of each timeslot in a measurement window.

37. The inventions taught in the '983 patent achieve improvements in traffic shaping systems by creating request signals that request timeslots for transmitting data out of the buffer. Implementation of the system and methods disclosed in the '983 patent is directed to a specific improvement in computer technology - delivering data packets from at least one traffic source at a substantially uniform rate. Further, the claims of the '983 patent are directed to specific asserted improvements in computer capabilities. For example, the claims recite specific steps – a counter that indicates the beginning of each of a number of time slots over a selectable time period – that accomplish the desired result – delivering data packets at a substantially uniform rate.

38. The '983 patent claims a technical solution to a problem unique to computer systems: delivering data packets to a virtual connection.

39. The '983 patent family has been cited by 61 United States patents and patent applications as relevant prior art. Specifically, patents issued to the following companies have cited the '983 patent family as relevant prior art:

- Alcatel-Lucent S.A.
- AT&T, Inc.
- Broadcom Corporation
- End II End Communications, Inc.
- Intel Corporation
- InterDigital, Inc.
- International Business Machines Corporation
- ORBCOMM, Inc.
- PRO DESIGN Electronics GmbH
- Riverstone Networks, Inc.
- Verizon Communications, Inc.

U.S. PATENT NO. 6,847,609

40. U.S. Patent No. 6,847,609 (“the ‘609 patent”) entitled, *Shared Management of Network Entity*, was filed on August 18, 1999, and claims priority to June 29, 1999. DIFF Scale Operation Research is the owner of all right, title, and interest in the ‘609 patent. A true and correct copy of the ‘609 patent is attached hereto as Exhibit B.

41. The ‘609 patent claims specific methods and systems for improved management of network entities at the point of demarcation that allows the service provider and enterprise flexibility in creating enterprise networks. The systems and methods claimed by the ‘609 patent include a network entity that is configurable to be jointly managed by at least two network management stations, *e.g.*, a network management station controlled by the enterprise and a network management station controlled by a service provider. Advantageously, this provides greater flexibility to service providers and enterprises in implementing an enterprise network.

42. The ‘609 patent teaches a method and system where a number of local area networks are each coupleable to at least one network element of a service provider network.

43. The ‘609 patent further teaches the use of a service delivery unit that allows management functions for a network to be divided or shared by the service provider and the enterprise network.

44. Another insight for improving the performance of enterprise networks described by the ‘609 patent is to have a network management terminal communicatively coupled to one network element of the service provider network such that the network management terminal is operable to view a configurable portion of data stored in memory.

45. Further, the ‘609 patent improves the performance of an enterprise network by facilitating management of selected aspects of a network element.

46. The '609 patent further discloses monitoring operation of a telecommunications network at a network entity.

47. Among the inventions disclosed in the '609 patent is bifurcating management of a network by having a network management station of an enterprise network view a first, configurable portion of the management data.

48. The inventions taught in the '609 patent achieve improvements in enterprise networks by having a network entity that is configurable to be jointly managed by at least two network management stations, e.g., a network management station controlled by the enterprise and a network management station controlled by a service provider. This provides greater flexibility to service providers and enterprises in implementing an enterprise network. Implementation of the system and methods disclosed in the '609 patent are directed to a specific improvement in computer technology – enterprise networks. Further, the claims of the '609 patent are directed to specific improvements in computer capabilities. For example, the claims recite specific steps – a network management terminal communicatively coupled to the at least one network element of the service provider network – that accomplish the desired result.

49. The '609 patent claims a technical solution to a problem unique to computer systems: improved management of network entities at the point of demarcation.

50. The '609 patent and its related patents have been cited by 61 United States patents and patent applications as relevant prior art. Specifically, patents issued to the following companies have cited the '609 patent family as relevant prior art:

- Aerohive Networks, Inc.
- Alcatel-Lucent S.A.
- Allied Telesis K.K.
- AT&T, Inc.
- Avaya, Inc.
- Ciena Corporation

- Cisco Systems, Inc.
- International Business Machines Corporation
- Microsoft Corporation
- Narad Networks, Inc.
- Packeteer, Inc.
- SBCX Properties, L.P.
- Sun Microsystems, Inc.
- Telecom Italia S.p.A.

U.S. PATENT NO. 6,940,810

51. U.S. Patent No. 6,940,810 (“the ‘810 patent”) entitled, *Protection Switching of Virtual Connections at the Data Link Layer*, was filed on October 25, 2000, and claims priority to February 20, 1998. The ‘810 patent is subject to a 35 U.S.C. § 154(b) term extension of 875 days. DIFF Scale Operation Research is the owner of all right, title, and interest in the ‘810 patent. A true and correct copy of the ‘810 patent is attached hereto as Exhibit C.

52. The ‘810 patent claims specific methods and systems for protection switching in a network that uses virtual connections. The system includes first and second switch fabrics, unidirectional busses that provide a communication path between the first and second switch fabrics, and network elements that separately track the status of a number of virtual connections such that when an error is detected by one of the switch fabrics, the error is communicated to the other switch fabric.

53. The ‘810 patent teaches a method and system wherein the first and second switch fabrics of each network element are associated with a route.

54. The ‘810 patent further teaches the use of a first and second uni-directional bus that is used to communicate the change in state for a virtual connection.

55. Another insight for improving the performance of a network described by the ‘810 patent is to have a number of ring segments coupled between adjacent network elements to form first and second routes for transporting cells using virtual connections.

56. The ‘810 patent further discloses at least two uni-directional busses coupled between two switch fabrics.

57. Among the inventions disclosed in the ‘810 patent is a ring network that includes two routes for transporting cells using a virtual connection. Further, for each virtual connection, one route is the working route and the other route is the protection route.

58. The inventions taught in the ‘810 patent achieve improvements in computer network systems by using virtual connections to communicate between two switch fabrics. Implementation of the system and methods disclosed in the ‘810 patent is directed to a specific improvement in computer technology – protection switching in a network that uses virtual connections. Further, the claims of the ‘810 patent are directed to specific asserted improvements in computer networking capabilities. For example, the claims recite specific steps – first and second unidirectional busses that provide a communication path between the first and second switch fabrics – that accomplish the desired result.

59. The ‘810 patent claims a technical solution to a problem unique to computer systems: network survivability following errors.

60. The ‘810 patent and its related patents have been cited by 17 United States patents and patent applications as relevant prior art. Specifically, patents issued to the following companies have cited the ‘810 patent family as relevant prior art:

- Brocade Communications Systems, Inc. (now part of Broadcom Limited)
- Foundry Networks LLC (now part of Broadcom Limited)
- Ciena Corporation
- Audiocodes Texas, Inc.

- Hewlett-Packard Development Company, L.P.
- Positron Networks PNI, Inc.
- Samsung Electronics Co., Ltd.
- Symantec Corporation
- Tekelec, Inc. (now part of Oracle Corporation)
- Telefonaktiebolaget LM Ericsson
- Broadcom Limited

U.S. PATENT NO. 6,990,110

61. U.S. Patent No. 6,990,110 (“the ‘110 patent”) entitled, *Automatic Permanent Virtual Circuit Connection Activation For Connection Oriented Networks*, was filed on April 12, 2001. The ‘110 patent is subject to a 35 U.S.C. § 154(b) term extension of 530 days. DIFF Scale Operation Research is the owner of all right, title, and interest in the ‘110 patent. A true and correct copy of the ‘110 patent is attached hereto as Exhibit D.

62. The ‘110 patent claims specific methods and systems for improvements in end-to-end provisioning of communication systems. The system includes an access network, a central unit, and customer premises equipment. Further, the ‘110 patent describes a system wherein an automatic permanent virtual circuit connection is embedded within the central unit. The automatic permanent virtual circuit is enabled when the customer premises equipment is initialized and can create a translation connection between the customer premises equipment and the central unit.

63. The ‘110 patent teaches a method and system for automatic permanent virtual circuit connection activation.

64. The ‘110 patent further teaches the use of a central unit selectively coupled to the access network.

65. Another insight for improving the performance of a communications network described by the ‘110 patent is to have an automatic permanent virtual circuit connection activation

function embedded in the central unit. And, when the customer premises equipment is initialized, a translation connection between the customer premises equipment and the central unit is created.

66. The '110 patent further discloses a central unit that recognizes at least one virtual circuit identifier of the customer premises equipment by receiving traffic from the customer premises equipment.

67. Among the inventions disclosed in the '110 patent is a system for automatically configuring a permanent virtual circuit in an asynchronous transfer mode network

68. The inventions taught in the '110 patent achieve improvements in end-to-end provisioning of communication networks by creating a translation connection between the customer premises equipment and the central unit. Implementation of the system and methods disclosed in the '110 patent is directed to a specific improvement in computer technology - end-to-end provisioning of communication systems. Further, the claims of the '110 patent are directed to specific asserted improvements in computer capabilities. For example, the claims recite specific steps – detecting initiation of communication at a user network interface between a first and a second network element and creating a translation connection between the first and second network elements – that accomplish the desired result.

69. The '110 patent claims a technical solution to a problem unique to computer systems: end-to-end provisioning of communication systems.

70. The '110 patent and its related patents have been cited by 34 United States patents and patent applications as relevant prior art. Specifically, patents issued to the following companies have cited the '110 patent family as relevant prior art:

- Alcatel-Lucent S.A.
- AT&T, Inc.
- BellSouth Intellectual Property Corporation
- Brooktree Broadband Holding, Inc. (now part of Synaptics, Inc.)

- Cisco Systems, Inc.
- Fujitsu, Ltd.
- Huawei Technologies Co., Ltd.
- Intel Corporation
- Nant Holdings IP, LLC
- NEC Corporation
- SBC Properties, L.P.
- Tellabs, Inc.
- Wireless LAN Systems Oy

U.S. PATENT NO. 7,239,627

71. U.S. Patent No. 7,239,627 (“the ‘627 patent”) entitled, *Digital Subscriber Line Services*, was filed on May 24, 2001. The ‘627 patent is subject to a 35 U.S.C. § 154(b) term extension of 982 days. DIFF Scale Operation Research is the owner of all right, title, and interest in the ‘627 patent. A true and correct copy of the ‘627 patent is attached hereto as Exhibit E.

72. The ‘627 patent claims specific systems for extending the effective distance of digital subscriber line service. The system includes a central office terminal containing a data interface and line units. Further, the system comprises one or more communications links that couple the line units. The communication links are twisted pairs that contain functionality for carrying signals using the digital subscriber line service.

73. The ‘627 patent teaches a system that comprises a multiplexer that is connected to the communications link.

74. The ‘627 patent further teaches a multiplexer that is connected to the communications link through a port. Further, the multiplexer comprises subscriber ports that are adapted to be connected to the communications links. Finally, the multiplexer contains functionality for multiplexing signals between the port connected to the communications link and the subscriber ports.

75. Another insight for improving the performance of digital subscriber line service described by the '627 patent is to have a remote access multiplexer adapted to multiplex signals between the plurality of ports and the at least one communication link.

76. The '627 patent further discloses at least one communication link, coupled to one of the plurality of line units, that carries signals using digital subscriber line service

77. The inventions taught in the '627 patent achieve improvements in digital subscriber line service by multiplexing signals between the plurality of ports and at least one communication link. Implementation of the system disclosed in the '627 patent is directed to a specific improvement in computer technology - extending the effective distance of digital subscriber line service. Further, the claims of the '627 patent are directed to specific asserted improvements in computer capabilities. For example, the claims recite specific steps – the remote access multiplexer adapted to multiplex signals between the plurality of ports and the at least one communication link – that accomplish the desired result.

78. The '627 patent claims a technical solution to a problem unique to computer systems: improvements in the provision of asymmetric digital subscriber line services.

79. The '627 patent and its related patents have been cited by 50 United States patents and patent applications as relevant prior art. Specifically, patents issued to the following companies have cited the '627 patent family as relevant prior art:

- Alcatel-Lucent S.A.
- Conversant Intellectual Property Management Inc.
- Genesis Technical Systems Corp.
- Hella KGaA Hueck & Co.
- Sprint Corporation
- Wireless LAN Systems Oy

U.S. PATENT NO. 6,216,166

80. U.S. Patent No. 6,216,166 (“the ‘166 patent”) entitled, *Shared Media Communications in a Virtual Connection Network*, was filed on February 20, 1998. DIFF Scale Operation Research is the owner of all right, title, and interest in the ‘166 patent. A true and correct copy of the ‘166 patent is attached hereto as Exhibit F.

81. The ‘166 patent claims specific methods and systems for efficient shared media communications in a virtual connection network. The system includes network elements including elements providing for switching and transport and a policing network element that contains functionality for terminating a local area network group of data that has a corrupted media access address.

82. The ‘166 patent teaches a method and system for shared media communications in a virtual connection network.

83. The ‘166 patent further teaches the assigning of media access control (MAC) addresses to network elements.

84. Another insight for improving the performance of a computer network described by the ‘166 patent is to have a unique (MAC) address assigned to each network element.

85. The ‘166 patent further discloses a policing network element that terminates any local area network type groups of data that have corrupted source or destination MAC addresses.

86. Among the inventions disclosed in the ‘166 patent is a system for a virtual connection dedicated to transmitting packets including management data to the network elements based on the MAC addresses of each of the network elements.

87. The inventions taught in the ‘166 patent achieve improvements in virtual connection networks by policing network elements and terminating network elements with

corrupted source or destination MAC addresses. Implementation of the system and methods disclosed in the ‘166 patent are directed to a specific improvement in computer technology – policing network elements with corrupted media access control addresses. Further, the claims of the ‘166 patent are directed to specific asserted improvements in computer capabilities. For example, the claims recite specific steps – assigning each network element a media access control address and terminating network elements with corrupted media access control addresses – that accomplish the desired result.

88. The ‘166 patent claims a technical solution to a problem unique to computer systems: multicasting management data on a virtual connection network.

89. The ‘166 patent and its related patents have been cited by 14 United States patents and patent applications as relevant prior art. Specifically, patents issued to the following companies have cited the ‘166 patent family as relevant prior art:

- Alcatel-Lucent S.A.
- Avaya, Inc.
- Fujitsu, Ltd.
- NEC Corporation
- Nokia Corporation
- Nortel Networks Corporation
- Orbit Communication Systems, Ltd.
- Qwest Communications International, Inc. (now owned by CenturyLink, Inc.)
- Thomson Licensing S.A. (now Technicolor SA)

U.S. PATENT NO. 6,233,221

90. U.S. Patent No. 6,233,221 (“the ‘221 patent”) entitled, *System and Method for a Ring Network with Virtual Path Connections*, was filed on February 20, 1998. DIFF Scale Operation Research is the owner of all right, title, and interest in the ‘221 patent. A true and correct copy of the ‘221 patent is attached hereto as Exhibit G.

91. The '221 patent claims specific methods and systems for a virtual path ring network. The system includes an add/drop multiplexer and when the destination address corresponds to an endpoint that is not associated with the add/drop multiplexer the system and methods in '221 patent teach switching the packet back out onto the ring.

92. The '221 patent teaches a method and system for processing packets in an add/drop multiplexer.

93. The '221 patent further teaches the use of a first sub-network that includes a number of add/drop multiplexers coupled to form a ring including first and second routes for transmitting data around the network;

94. Another insight for improving the performance of a virtual path network described by the '221 patent is to have a first ring interconnection module that interconnects the first sub-network with one of the routes of the second sub-network.

95. The '221 patent further discloses the use of a sub-network in a virtual path network that includes a number of add/drop multiplexers coupled to form another ring network for transmitting data around a network.

96. Among the inventions disclosed in the '221 patent is a system for a virtual path network with two sub-networks that each include an add/drop multiplexer for transmitting data around the network.

97. The inventions taught in the '221 patent achieve improvements in a virtual path ring network. Implementation of the system and methods disclosed in the '221 patent is directed to a specific improvement in computer technology – a ring network with virtual connections that survives a single point of failure and can interconnect with other ring networks without interfering with the operation of the other ring networks. Further, the claims of the '221 patent are directed

to specific asserted improvements in computer capabilities. For example, the claims recite specific steps – interconnection module that interconnects the first sub-network with the other route of the second sub-network – that accomplish the desired result.

98. The ‘221 patent claims a technical solution to a problem unique to computer systems: preventing a single point of failure from bringing down a network element and network.

99. The ‘221 patent and its related patents have been cited by 15 United States patents and patent applications as relevant prior art. Specifically, patents issued to the following companies have cited the ‘221 patent family as relevant prior art:

- Beijing Kaihua Network Alliance Technology Co., Ltd
- Coriant Operations, Inc. (part of Tellabs, Inc.)
- Telefonaktiebolaget LM Ericsson
- Fujitsu, Ltd.
- Lucent Technologies, Inc.
- Micron Technology, Inc.
- NEC Corporation
- Nortel Networks Limited
- Siemens AG
- Texas Instruments, Inc.

U.S. PATENT NO. 7,170,894

100. U.S. Patent No. 7,170,894 (“the ‘894 patent”) entitled, *Establishment of an End To End Virtual Connection*, was filed on December 22, 2001. The ‘894 patent is subject to a 35 U.S.C. § 154(b) term extension of 875 days. DIFF Scale Operation Research is the owner of all right, title, and interest in the ‘894 patent. A true and correct copy of the ‘894 patent is attached hereto as Exhibit H.

101. The ‘894 patent claims specific methods and systems for establishing an end to end virtual connection. The system includes a digital subscriber line access multiplexer. Further, the claimed systems and methods of the ‘894 patent describe establishing a permanent

virtual circuit between customer premises equipment and the digital subscriber line access multiplexer.

102. The '894 patent teaches a method and system for embedding information for a permanent virtual connection between a switch and a remote node in a packet transmitted over a static connection in a network.

103. The '894 patent further teaches establishing a permanent virtual circuit between the switch and the remote node based on the embedded information.

104. Another insight for improving the performance of end to end virtual connection described by the '894 patent is to have a permanent virtual circuit that connects a digital subscriber line access multiplexer to customer premises equipment.

105. The inventions taught in the '894 patent achieve improvements in end to end virtual connections by using a digital subscriber line access multiplexer. Implementation of the system and methods disclosed in the '894 patent is directed to specific improvements in computer technology – communicating information necessary to establish a permanent virtual connection at a switch to provide end-to-end connectivity.

106. Further, the claims of the '894 patent are directed to specific asserted improvements in computer capabilities. For example, the claims recite specific steps – establishing a permanent virtual circuit between the switch and the remote node based on the at least slot, port, VPI and VCI information to complete the end-to-end connection – that accomplish the desired result.

107. The '894 patent claims a technical solution to a problem unique to computer systems: establishing a virtual permanent connection.

108. The '894 patent and its related patents have been cited by AT&T Corporation as relevant prior art. *See* U.S. Patent App. No. 2004/0004965A1.

U.S. PATENT NO. 6,859,430

109. U.S. Patent No. 6,859,430 (“the ‘430 patent”) entitled, *Protection Switching of Virtual Connections*, was filed on October 1, 1999, and claims priority to February 20, 1998. DIFF Scale Operation Research is the owner of all right, title, and interest in the ‘430 patent. A true and correct copy of the ‘430 patent is attached hereto as Exhibit I.

110. The ‘430 patent claims specific methods and systems for the protection of virtual connections in a network.

111. The inventions taught in the ‘430 patent achieve improvements in networking systems. Implementation of the system and methods disclosed in the ‘430 patent is directed to a specific improvement in computer technology – virtual connection switching. Further, the claims of the ‘430 patent are directed to specific asserted improvements in computer capabilities

112. The ‘430 patent and its related patents have been cited by 16 United States patents and patent applications as relevant prior art. Specifically, patents issued to the following companies have cited the ‘430 patent family as relevant prior art:

- Adtran, Inc.
- Ciena Corporation
- Hewlett-Packard Development Company, L.P.
- Infinera Corporation
- Mitsubishi Denki Kabushiki Kaisha
- Nortel Networks, Ltd.
- Alcatel-Lucent S.A.

COUNT I
INFRINGEMENT OF U.S. PATENT NO. 6,407,983

113. DIFF Scale Operation Research references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

114. Calix designs, makes, uses, sells, and/or offers for sale in the United States products and/or services for traffic shaping that deliver data packets from one traffic source at a substantially uniform rate.

115. Calix designs, makes, sells, offers to sell, imports, and/or uses Calix E-Series Products, including: Calix E7-2, Calix E7-20, Calix E3-48C, Calix E5-48C, Calix E5-48, and Calix E3-8G (collectively, the “Calix ‘983 Product(s)”).

116. On information and belief, one or more Calix subsidiaries and/or affiliates use the Calix ‘983 Products in regular business operations.

117. On information and belief, one or more of the Calix ‘983 Products include technology for traffic shaping.

118. On information and belief, one or more of the Calix ‘983 Products include technology for controlling data traffic on a network to match its transmission to the speed of the remote target interface.

119. On information and belief, the Calix ‘983 Products are available to businesses and individuals throughout the United States.

120. On information and belief, the Calix ‘983 Products are provided to businesses and individuals located in the Eastern District of Texas.

121. On information and belief, Calix has directly infringed and continues to directly infringe the ‘983 patent by, among other things, making, using, offering for sale, and/or selling technology for traffic shaping, including but not limited to the Calix ‘983 Products, which include infringing technology for delivering data packets from at least one traffic source at a substantially uniform rate. Such products and/or services include, by way of example and without limitation, the Calix ‘983 Products.

122. On information and belief, the Calix '983 Products comprise a buffer that receives packets from at least one traffic source.

123. On information and belief, the Calix '983 Products include a counter that indicates the beginning of each of a number of timeslots over a selectable time period.

124. On information and belief, the Calix '983 Products comprise a request generator that creates request signals that request timeslots for transmitting data out of the buffer, wherein the requests are distributed over the time period based on at least one table so as to establish a desired data rate for the traffic source.

125. By making, using, testing, offering for sale, and/or selling products and services, including but not limited to the Calix '983 Products, Calix has injured DIFF Scale Operation Research and is liable for directly infringing one or more claims of the '983 patent, including at least claim 8, pursuant to 35 U.S.C. § 271(a).

126. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '983 patent.

127. As a result of Calix's infringement of the '983 patent, DIFF Scale Operation Research has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Calix's infringement, but in no event less than a reasonable royalty for the use made of the invention by Calix together with interest and costs as fixed by the Court.

COUNT II
INFRINGEMENT OF U.S. PATENT NO. 6,847,609

128. DIFF Scale Operation Research references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

129. Calix designs, makes, uses, sells, and/or offers for sale in the United States products and/or services for network management.

130. Calix designs, makes, sells, offers to sell, imports, and/or uses Calix Management System (CMS) Versions R14.0 and R14.1 (collectively, the “Calix ‘609 Product(s)”).

131. On information and belief, one or more Calix subsidiaries and/or affiliates use the Calix ‘609 Products in regular business operations.

132. On information and belief, one or more of the Calix ‘609 Products include technology for managing network elements.

133. On information and belief, one or more of the Calix ‘609 Products enable management of a network topology in which network nodes interconnect via one or more network switches.

134. On information and belief, the Calix ‘609 Products are available to businesses and individuals throughout the United States.

135. On information and belief, the Calix ‘609 Products are provided to businesses and individuals located in the Eastern District of Texas.

136. On information and belief, Calix has directly infringed and continues to directly infringe the ‘609 patent by, among other things, making, using, offering for sale, and/or selling technology for management of network entities, including but not limited to the Calix ‘609 Products, which include infringing technology for network management. Such products and/or services include, by way of example and without limitation, the Calix ‘609 Products.

137. On information and belief, the Calix ‘609 Products comprise a system that includes a service delivery unit that has a network interface port.

138. On information and belief, the Calix '609 Products include functionality for a service delivery unit that is configured to store configuration data, control data, billing data, diagnostic data, and/or management data.

139. On information and belief, the Calix '609 Products are a system that includes a service delivery unit that contains a data port coupleable to at least one local area network ("LAN").

140. On information and belief, the Calix '609 Products comprise a system with a central processing unit that enables a network management terminal to view a configurable portion of the data in the memory and to allow a second network management terminal to view a second, configurable portion of the data in the memory to allow shared management of the service delivery unit.

141. On information and belief, the Calix '609 Products include functionality for connecting to a switch fabric.

142. By making, using, testing, offering for sale, and/or selling products and services, including but not limited to the Calix '609 Products, Calix has injured DIFF Scale Operation Research and is liable for directly infringing one or more claims of the '609 patent, including at least claim 17, pursuant to 35 U.S.C. § 271(a).

143. On information and belief, Calix also indirectly infringes the '609 patent by actively inducing infringement under 35 USC § 271(b).

144. On information and belief, Calix has had knowledge of the '609 patent since at least service of this Complaint or shortly thereafter, and on information and belief, Calix knew of the '609 patent and knew of its infringement, including by way of this lawsuit.

145. On information and belief, Calix intended to induce patent infringement by third-party customers and users of the Calix ‘609 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement. Calix specifically intended and was aware that the normal and customary use of the accused products would infringe the ‘609 patent. Calix performed the acts that constitute induced infringement, and would induce actual infringement, with knowledge of the ‘609 patent and with the knowledge that the induced acts would constitute infringement. For example, Calix provides the Calix ‘609 Products that have the capability of operating in a manner that infringe one or more of the claims of the ‘609 patent, including at least claim 17, and Calix further provides documentation and training materials that cause customers and end users of the Calix ‘609 Products to utilize the products in a manner that directly infringe one or more claims of the ‘609 patent.³⁰ By providing instruction and training to customers and end-users on how to use the Calix ‘609 Products in a manner that directly infringes one or more claims of the ‘609 patent, including at least claim 17, Calix specifically intended to induce infringement of the ‘609 patent. On information and belief, Calix engaged in such inducement to promote the sales of the Calix ‘609 Products, e.g., through Calix user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the ‘609 patent. Accordingly, Calix has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the ‘609 patent, knowing that such use constitutes infringement of the ‘609 patent.

³⁰ See, e.g., CALIX MANAGEMENT SYSTEM (CMS) R14.0 GUIDE (June 2016); CALIX E7 TRAINING, CALIX ACADEMY (2017).

146. The '609 patent is well-known within the industry as demonstrated by multiple citations to the '609 patent in published patents and patent applications assigned to technology companies and academic institutions. Calix is utilizing the technology claimed in the '609 patent without paying a reasonable royalty. Calix is infringing the '609 patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

147. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '609 patent.

148. As a result of Calix's infringement of the '609 patent, DIFF Scale Operation Research has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Calix's infringement, but in no event less than a reasonable royalty for the use made of the invention by Calix together with interest and costs as fixed by the Court.

COUNT III
INFRINGEMENT OF U.S. PATENT NO. 6,940,810

149. DIFF Scale Operation Research references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

150. Calix designs, makes, uses, sells, and/or offers for sale in the United States products and/or services for ring networks.

151. Calix designs, makes, sells, offers to sell, imports, and/or uses Calix E7 OS Series products including: Calix E7-2 and Calix E7-20 (collectively, the "Calix '810 Product(s)").

152. On information and belief, one or more Calix subsidiaries and/or affiliates use the Calix '810 Products in regular business operations.

153. On information and belief, one or more of the Calix '810 Products include technology for protection switching of virtual connections at the data link level.

154. On information and belief, the Calix '810 Products are available to businesses and individuals throughout the United States.

155. On information and belief, the Calix '810 Products are provided to businesses and individuals located in the Eastern District of Texas.

156. On information and belief, Calix has directly infringed and continues to directly infringe the '810 patent by, among other things, making, using, offering for sale, and/or selling networking technology, including but not limited to the Calix '810 Products, which include infringing technology for protection switching of virtual connections at the data link layer. Such products and/or services include, by way of example and without limitation, the Calix '810 Products.

157. The Calix '810 Products comprise a system for a ring network.

158. The Calix '810 Products include functionality for two or more uni-directional busses that connect a first and second switch fabrics.

159. The Calix '810 Products are a system wherein ring segments connected between adjacent network elements form routes for transporting cells using virtual connections.

160. The Calix '810 Products comprise a system, wherein for each virtual connection, one route is a working route and the other route is a protection route.

161. The Calix '810 Products comprise a system where the first and second routes are associated with the first and second switch fabrics.

162. By making, using, testing, offering for sale, and/or selling products and services, including but not limited to the Calix '810 Products, Calix has injured DIFF Scale Operation

Research and is liable for directly infringing one or more claims of the ‘810 patent, including at least claim 13, pursuant to 35 U.S.C. § 271(a).

163. On information and belief, Calix also indirectly infringes the ‘810 patent by actively inducing infringement under 35 USC § 271(b).

164. On information and belief, Calix has had knowledge of the ‘810 patent since at least service of this Complaint or shortly thereafter, and on information and belief, Calix knew of the ‘810 patent and knew of its infringement, including by way of this lawsuit.

165. On information and belief, Calix intended to induce patent infringement by third-party customers and users of the Calix ‘810 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement. Calix specifically intended and was aware that the normal and customary use of the accused products would infringe the ‘810 patent. Calix performed the acts that constitute induced infringement, and would induce actual infringement, with knowledge of the ‘810 patent and with the knowledge that the induced acts would constitute infringement. For example, Calix provides the Calix ‘810 Products that have the capability of operating in a manner that infringe one or more of the claims of the ‘810 patent, including at least claim 13, and Calix further provides documentation and training materials that cause customers and end users of the Calix ‘810 Products to utilize the products in a manner that directly infringe one or more claims of the ‘810 patent.³¹ By providing instruction and training to customers and end-users on how to use the Calix ‘810 Products in a manner that directly infringes one or more claims of the ‘810 patent, including at least claim 13, Calix specifically intended to induce infringement of the ‘810 patent. On

³¹ *Calix E7 GPON-4*, CALIX PRODUCT DATASHEET (2009); *Calix E7-2 Ethernet Service Access Platform*, CALIX PRODUCT DATA SHEET (2012); *Metro Ethernet 101*, CALIX PRESENTATION (July 15, 2014); *Calix E7-20 GPON-8x*, CALIX DATASHEET (2014).

information and belief, Calix engaged in such inducement to promote the sales of the Calix ‘810 Products, e.g., through Calix user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the ‘810 patent. Accordingly, Calix has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the ‘810 patent, knowing that such use constitutes infringement of the ‘810 patent.

166. The ‘810 patent is well-known within the industry as demonstrated by multiple citations to the ‘810 patent in published patents and patent applications assigned to technology companies and academic institutions. Calix is utilizing the technology claimed in the ‘810 patent without paying a reasonable royalty. Calix is infringing the ‘810 patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

167. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the ‘810 patent.

168. As a result of Calix’s infringement of the ‘810 patent, DIFF Scale Operation Research has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Calix’s infringement, but in no event less than a reasonable royalty for the use made of the invention by Calix together with interest and costs as fixed by the Court.

COUNT IV
INFRINGEMENT OF U.S. PATENT NO. 6,990,110

169. DIFF Scale Operation Research references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

170. Calix designs, makes, uses, sells, and/or offers for sale in the United States products and/or services for automatic connection activation of permanent virtual circuits in communication networks.

171. Calix designs, makes, sells, offers to sell, imports, and/or uses Calix E-Series Products, including: Calix E7-2, Calix E7-20, Calix E3-48C, Calix E5-48C, Calix E5-48, and Calix E3-8G (collectively, the “Calix ‘110 Product(s)”).

172. On information and belief, one or more Calix subsidiaries and/or affiliates use the Calix ‘110 Products in regular business operations.

173. On information and belief, one or more of the Calix ‘110 Products include technology for improvements in end-to-end provisioning of communication systems.

174. On information and belief, the Calix ‘110 Products are available to businesses and individuals throughout the United States.

175. On information and belief, the Calix ‘110 Products are provided to businesses and individuals located in the Eastern District of Texas.

176. On information and belief, Calix has directly infringed and continues to directly infringe the ‘110 patent by, among other things, making, using, offering for sale, and/or selling technology for automatic connection activation, including but not limited to the Calix ‘110 Products, which include infringing technology for automatic permanent virtual circuit connection activation. Such products and/or services include, by way of example and without limitation, the Calix ‘110 Products.

177. On information and belief, the Calix ‘110 Products comprise a system for detecting initiation of a communication at a user network interface between a first and second network element.

178. On information and belief, the Calix '110 Products include functionality for identifying a virtual circuit identifier of the first network element.

179. On information and belief, the Calix '110 Products include functionality for identifying a second virtual circuit identifier of the first network element.

180. On information and belief, the Calix '110 Products are a system that enables creation of a translation connection between the first and second network elements.

181. On information and belief, the Calix '110 Products enable identifying a virtual circuit identifier of the second network element that comprises receiving traffic from the second network element containing one virtual circuit identifier of the second network element and storing at least one virtual circuit identifier of the second network element.

182. By making, using, testing, offering for sale, and/or selling products and services, including but not limited to the Calix '110 Products, Calix has injured DIFF Scale Operation Research and is liable for directly infringing one or more claims of the '110 patent, including at least claim 1, pursuant to 35 U.S.C. § 271(a).

183. On information and belief, Calix also indirectly infringes the '110 patent by actively inducing infringement under 35 USC § 271(b).

184. On information and belief, Calix has had knowledge of the '110 patent since at least service of this Complaint or shortly thereafter, and on information and belief, Calix knew of the '110 patent and knew of its infringement, including by way of this lawsuit.

185. On information and belief, Calix intended to induce patent infringement by third-party customers and users of the Calix '110 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement. Calix specifically intended and was aware that the normal and customary use

of the accused products would infringe the ‘110 patent. Calix performed the acts that constitute induced infringement, and would induce actual infringement, with knowledge of the ‘110 patent and with the knowledge that the induced acts would constitute infringement. For example, Calix provides the Calix ‘110 Products that have the capability of operating in a manner that infringe one or more of the claims of the ‘110 patent, including at least claim 1, and Calix further provides documentation and training materials that cause customers and end users of the Calix ‘110 Products to utilize the products in a manner that directly infringe one or more claims of the ‘110 patent.³² By providing instruction and training to customers and end-users on how to use the Calix ‘110 Products in a manner that directly infringes one or more claims of the ‘110 patent, including at least claim 1, Calix specifically intended to induce infringement of the ‘110 patent. On information and belief, Calix engaged in such inducement to promote the sales of the Calix ‘110 Products, e.g., through Calix user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the ‘110 patent. Accordingly, Calix has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the ‘110 patent, knowing that such use constitutes infringement of the ‘110 patent.

186. The ‘110 patent is well-known within the industry as demonstrated by multiple citations to the ‘110 patent in published patents and patent applications assigned to technology companies and academic institutions. Calix is utilizing the technology claimed in the ‘110 patent without paying a reasonable royalty. Calix is infringing the ‘110 patent in a manner best described

³² See, e.g., CALIX E-SERIES (E7 OS R2.5) ENGINEERING AND PLANNING GUIDE (July 2016); *Calix E7-2 Ethernet Service Access Platform*, PRODUCT DATASHEET; and *Calix E3-48C Sealed ESAN*, PRODUCT DATASHEET.

as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

187. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the ‘110 patent.

188. As a result of Calix’s infringement of the ‘110 patent, DIFF Scale Operation Research has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Calix’s infringement, but in no event less than a reasonable royalty for the use made of the invention by Calix together with interest and costs as fixed by the Court.

COUNT V
INFRINGEMENT OF U.S. PATENT NO. 7,239,627

189. DIFF Scale Operation Research references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

190. Calix designs, makes, uses, sells, and/or offers for sale in the United States products and/or services for provisioning digital subscriber line services.

191. Calix designs, makes, sells, offers to sell, imports, and/or uses the Calix C7 Multiservice Access System (the “Calix ‘627 Product(s)”).

192. On information and belief, one or more Calix subsidiaries and/or affiliates use the Calix ‘627 Products in regular business operations.

193. On information and belief, one or more of the Calix ‘627 Products include technology for extending the effective distance of digital subscriber line services.

194. On information and belief, the Calix ‘627 Products are available to businesses and individuals throughout the United States.

195. On information and belief, the Calix '627 Products are provided to businesses and individuals located in the Eastern District of Texas.

196. On information and belief, Calix has directly infringed and continues to directly infringe the '627 patent by, among other things, making, using, offering for sale, and/or selling technology for provisioning digital subscriber line services, including but not limited to the Calix '627 Products, which include infringing technology for extending the effective distance of digital subscriber line service. Such products and/or services include, by way of example and without limitation, the Calix '627 Products.

197. On information and belief, the Calix '627 Products comprise a central office terminal that includes a data interface and a plurality of line units.

198. On information and belief, the Calix '627 Products comprise a communication link, coupled to one of the plurality of line units. The line units are capable of carrying signals using a digital subscriber line service, wherein each communication link is a twisted pair.

199. On information and belief, the Calix '627 Products contain a remote access multiplexer, coupled to a communications link.

200. On information and belief, the Calix '627 Products contain a remote access multiplexer that includes a plurality of ports that are adapted to provide a digital subscriber line service.

201. On information and belief, the he remote access multiplexer in the Calix '627 Products contain functionality for multiplexing signals between ports and a communication link.

202. On information and belief, the Calix '627 Products include a remote access multiplexer located at a distance from the central office terminal so as to provide digital subscriber line service to user terminals.

203. By making, using, testing, offering for sale, and/or selling products and services, including but not limited to the Calix '627 Products, Calix has injured DIFF Scale Operation Research and is liable for directly infringing one or more claims of the '627 patent, including at least claim 1, pursuant to 35 U.S.C. § 271(a).

204. On information and belief, Calix also indirectly infringes the '627 patent by actively inducing infringement under 35 USC § 271(b).

205. On information and belief, Calix has had knowledge of the '627 patent since at least service of this Complaint or shortly thereafter, and on information and belief, Calix knew of the '627 patent and knew of its infringement, including by way of this lawsuit.

206. On information and belief, Calix intended to induce patent infringement by third-party customers and users of the Calix '627 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement. Calix specifically intended and was aware that the normal and customary use of the accused products would infringe the '627 patent. Calix performed the acts that constitute induced infringement, and would induce actual infringement, with knowledge of the '627 patent and with the knowledge that the induced acts would constitute infringement. For example, Calix provides the Calix '627 Products that have the capability of operating in a manner that infringe one or more of the claims of the '627 patent, including at least claim 1, and Calix further provides documentation and training materials that cause customers and end users of the Calix '627 Products to utilize the products in a manner that directly infringe one or more claims of the '627 patent.³³ By providing instruction and training to customers and end-users on how to use the Calix

³³ See, e.g., C7 xDSL SERVICES, CALIX C7 TRAINING, CALIX ACADEMY (2017); C7 GPON SERVICES, CALIX C7 TRAINING, CALIX ACADEMY (2017); CALIX C7 BROADBAND INTERNET SERVICES GUIDE (R5.0) (July 2006).

‘627 Products in a manner that directly infringes one or more claims of the ‘627 patent, including at least claim 1, Calix specifically intended to induce infringement of the ‘627 patent. On information and belief, Calix engaged in such inducement to promote the sales of the Calix ‘627 Products, e.g., through Calix user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the ‘627 patent. Accordingly, Calix has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the ‘627 patent, knowing that such use constitutes infringement of the ‘627 patent.

207. The ‘627 patent is well-known within the industry as demonstrated by multiple citations to the ‘627 patent in published patents and patent applications assigned to technology companies and academic institutions. Calix is utilizing the technology claimed in the ‘627 patent without paying a reasonable royalty. Calix is infringing the ‘627 patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

208. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the ‘627 patent.

209. As a result of Calix’s infringement of the ‘627 patent, DIFF Scale Operation Research has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Calix’s infringement, but in no event less than a reasonable royalty for the use made of the invention by Calix together with interest and costs as fixed by the Court.

COUNT VI
INFRINGEMENT OF U.S. PATENT NO. 6,216,166

210. DIFF Scale Operation Research references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

211. Calix designs, makes, uses, sells, and/or offers for sale in the United States products and/or services for network management.

212. Calix designs, makes, sells, offers to sell, imports, and/or uses Calix E-Series Products, including: Calix E7-2, Calix E7-20, Calix E3-48C, Calix E5-48C, Calix E5-48, and Calix E3-8G (collectively, the “Calix ‘166 Product(s)”).

213. On information and belief, one or more Calix subsidiaries and/or affiliates use the Calix ‘166 Products in regular business operations.

214. On information and belief, one or more of the Calix ‘166 Products include technology for policing network elements.

215. On information and belief, the Calix ‘166 Products are available to businesses and individuals throughout the United States.

216. On information and belief, the Calix ‘166 Products are provided to businesses and individuals located in the Eastern District of Texas.

217. On information and belief, Calix has directly infringed and continues to directly infringe the ‘166 patent by, among other things, making, using, offering for sale, and/or selling technology for network management, including but not limited to the Calix ‘166 Products, which include infringing technology for policing network elements using a media access control address. Such products and/or services include, by way of example and without limitation, the Calix ‘166 Products.

218. On information and belief, the Calix '166 Products include network elements that perform switching and transport functions.

219. On information and belief, the Calix '166 Products include a policing network element that terminates a local area network group of data with a corrupted media access address relating to a network element.

220. On information and belief, the Calix '166 Products contain transmission media coupling the network elements and policing network elements to each other.

221. By making, using, testing, offering for sale, and/or selling products and services, including but not limited to the Calix '166 Products, Calix has injured DIFF Scale Operation Research and is liable for directly infringing one or more claims of the '166 patent, including at least claim 1, pursuant to 35 U.S.C. § 271(a).

222. The '166 patent is well-known within the industry as demonstrated by multiple citations to the '166 patent in published patents and patent applications assigned to technology companies and academic institutions. Calix is utilizing the technology claimed in the '166 patent without paying a reasonable royalty. Calix is infringing the '166 patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

223. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '166 patent.

224. As a result of Calix's infringement of the '166 patent, DIFF Scale Operation Research has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Calix's infringement, but in no event less than a reasonable royalty for the use made of the invention by Calix together with interest and costs as fixed by the Court.

COUNT VII
INFRINGEMENT OF U.S. PATENT NO. 6,233,221

225. DIFF Scale Operation Research references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

226. Calix designs, makes, uses, sells, and/or offers for sale in the United States products and/or services for a virtual path network.

227. Calix designs, makes, sells, offers to sell, imports, and/or uses Calix E-Series Products, including the Calix E7-2 and Calix E7-20 (collectively, the “Calix ‘221 Product(s)”).

228. On information and belief, one or more Calix subsidiaries and/or affiliates use the Calix ‘221 Products in regular business operations.

229. On information and belief, one or more of the Calix ‘221 Products include technology for network management.

230. On information and belief, the Calix ‘221 Products are available to businesses and individuals throughout the United States.

231. On information and belief, the Calix ‘221 Products are provided to businesses and individuals located in the Eastern District of Texas.

232. On information and belief, Calix has directly infringed and continues to directly infringe the ‘221 patent by, among other things, making, using, offering for sale, and/or selling technology for network management, including but not limited to the Calix ‘221 Products, which include infringing technology for a ring network with virtual path connections. Such products and/or services include, by way of example and without limitation, the Calix ‘221 Products.

233. On information and belief, the Calix ‘221 Products comprise a system that includes add/drop multiplexers coupled to form a ring including first and second routes for transmitting data around the network.

234. On information and belief, the Calix '221 Products include at least one sub-network that includes a number of add/drop multiplexers coupled to form a ring including first and second routes for transmitting data around the network.

235. On information and belief, the Calix '221 Products contain functionality for a first ring interconnection module that interconnects the first sub-network with one of the routes of the second sub-network.

236. By making, using, testing, offering for sale, and/or selling products and services, including but not limited to the Calix '221 Products, Calix has injured DIFF Scale Operation Research and is liable for directly infringing one or more claims of the '221 patent, including at least claim 18, pursuant to 35 U.S.C. § 271(a).

237. The '221 patent is well-known within the industry as demonstrated by multiple citations to the '221 patent in published patents and patent applications assigned to technology companies and academic institutions. Calix is utilizing the technology claimed in the '221 patent without paying a reasonable royalty. Calix is infringing the '221 patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

238. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '221 patent.

239. As a result of Calix's infringement of the '221 patent, DIFF Scale Operation Research has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Calix's infringement, but in no event less than a reasonable royalty for the use made of the invention by Calix together with interest and costs as fixed by the Court.

COUNT VIII
INFRINGEMENT OF U.S. PATENT NO. 7,170,894

240. DIFF Scale Operation Research references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

241. Calix designs, makes, uses, sells, and/or offers for sale in the United States products and/or services for establishment of an end to end virtual connection.

242. Calix designs, makes, sells, offers to sell, imports, and/or uses the Calix C7 Multiservice Access System (the “Calix ‘894 Product(s)”).

243. On information and belief, one or more Calix subsidiaries and/or affiliates use the Calix ‘894 Products in regular business operations.

244. On information and belief, one or more of the Calix ‘894 Products include technology for network management.

245. On information and belief, the Calix ‘894 Products are available to businesses and individuals throughout the United States.

246. On information and belief, the Calix ‘894 Products are provided to businesses and individuals located in the Eastern District of Texas.

247. On information and belief, Calix has directly infringed and continues to directly infringe the ‘894 patent by, among other things, making, using, offering for sale, and/or selling technology for network management, including but not limited to the Calix ‘894 Products, which include infringing technology for digital subscriber line access multiplexer. Such products and/or services include, by way of example and without limitation, the Calix ‘894 Products.

248. On information and belief, the Calix ‘894 Products comprise a channel card coupled to customer premises equipment over a communication line.

249. On information and belief, the Calix '894 Products include a line card, coupled to a data network. Further, the line card provides communication between customer premises equipment and a remote node coupled to the data network.

250. On information and belief, the Calix '894 Products contain functionality for embedding information for a permanent virtual connection between the remote node and a switch of the data network when a packet transmitted over a static connection in the data network is sent between a line card and a switch.

251. By making, using, testing, offering for sale, and/or selling products and services, including but not limited to the Calix '894 Products, Calix has injured DIFF Scale Operation Research and is liable for directly infringing one or more claims of the '894 patent, including at least claim 1, pursuant to 35 U.S.C. § 271(a).

252. On information and belief, Calix also indirectly infringes the '894 patent by actively inducing infringement under 35 USC § 271(b).

253. On information and belief, Calix has had knowledge of the '894 patent since at least service of this Complaint or shortly thereafter, and on information and belief, Calix knew of the '894 patent and knew of its infringement, including by way of this lawsuit.

254. On information and belief, Calix intended to induce patent infringement by third-party customers and users of the Calix '894 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement. Calix specifically intended and was aware that the normal and customary use of the accused products would infringe the '894 patent. Calix performed the acts that constitute induced infringement, and would induce actual infringement, with knowledge of the '894 patent and with the knowledge that the induced acts would constitute infringement. For example, Calix

provides the Calix '894 Products that have the capability of operating in a manner that infringe one or more of the claims of the '894 patent, including at least claim 1, and Calix further provides documentation and training materials that cause customers and end users of the Calix '894 Products to utilize the products in a manner that directly infringe one or more claims of the '894 patent.³⁴ By providing instruction and training to customers and end-users on how to use the Calix '894 Products in a manner that directly infringes one or more claims of the '894 patent, including at least claim 1, Calix specifically intended to induce infringement of the '894 patent. On information and belief, Calix engaged in such inducement to promote the sales of the Calix '894 Products, e.g., through Calix user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the '894 patent. Accordingly, Calix has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the '894 patent, knowing that such use constitutes infringement of the '894 patent.

255. The '894 patent is well-known within the industry as demonstrated by multiple citations to the '894 patent in published patents and patent applications assigned to technology companies and academic institutions. Calix is utilizing the technology claimed in the '894 patent without paying a reasonable royalty. Calix is infringing the '894 patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

256. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '894 patent.

³⁴ See, e.g., C7 xDSL SERVICES, CALIX C7 TRAINING, CALIX ACADEMY (2017); C7 GPON SERVICES, CALIX C7 TRAINING, CALIX ACADEMY (2017); CALIX C7 BROADBAND INTERNET SERVICES GUIDE (R5.0) (July 2006).

257. As a result of Calix's infringement of the '894 patent, DIFF Scale Operation Research has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Calix's infringement, but in no event less than a reasonable royalty for the use made of the invention by Calix together with interest and costs as fixed by the Court.

COUNT IX
INFRINGEMENT OF U.S. PATENT NO. 6,859,430

258. DIFF Scale Operation Research references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

259. Calix designs, makes, uses, sells, and/or offers for sale in the United States products and/or services for protection switching in a ring network.

260. Calix designs, makes, sells, offers to sell, imports, and/or uses Calix E-Series Products, including the Calix E3-48 (the "Calix '430 Product(s)").

261. On information and belief, one or more Calix subsidiaries and/or affiliates use the Calix '430 Products in regular business operations.

262. On information and belief, one or more of the Calix '430 Products include technology for network management.

263. On information and belief, the Calix '430 Products are available to businesses and individuals throughout the United States.

264. On information and belief, the Calix '430 Products are provided to businesses and individuals located in the Eastern District of Texas.

265. On information and belief, Calix has directly infringed and continues to directly infringe the '430 patent by, among other things, making, using, offering for sale, and/or selling technology for network management, including but not limited to the Calix '430 Products, which

include infringing technology for protection switching in a ring network. Such products and/or services include, by way of example and without limitation, the Calix '430 Products.

266. On information and belief, the Calix '430 Products comprise a number of network elements.

267. On information and belief, the Calix '430 Products contain ring segments coupled between adjacent network elements to form first and second routes for transporting cells using virtual connections wherein, for each virtual connection, one route is a working route and the other route is a protection route.

268. On information and belief, the Calix '430 Products contain functionality wherein each network element separately tracks the status of a number of virtual connections on each route such that when an error is detected on the working route for a virtual connection, the network element switches to the protection route for the virtual connection.

269. On information and belief, the Calix '430 Products comprise a system wherein each network element includes two ring interface modules having a microprocessor, a physical layer device, and a switch fabric.

270. By making, using, testing, offering for sale, and/or selling products and services, including but not limited to the Calix '430 Products, Calix has injured DIFF Scale Operation Research and is liable for directly infringing one or more claims of the '430 patent, including at least claim 6, pursuant to 35 U.S.C. § 271(a).

271. The '430 patent is well-known within the industry as demonstrated by multiple citations to the '430 patent in published patents and patent applications assigned to technology companies and academic institutions. Calix is utilizing the technology claimed in the '430 patent without paying a reasonable royalty. Calix is infringing the '430 patent in a manner best described

as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

272. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '430 patent.

273. As a result of Calix's infringement of the '430 patent, DIFF Scale Operation Research has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Calix's infringement, but in no event less than a reasonable royalty for the use made of the invention by Calix together with interest and costs as fixed by the Court.

PRAYER FOR RELIEF

WHEREFORE, DIFF Scale Operation Research respectfully requests that this Court enter:

- A. A judgment in favor of DIFF Scale Operation Research that Calix has infringed, either literally and/or under the doctrine of equivalents, the '983, '609, '110, '810, '627, '166, '221, '894, and '430 patents;
- B. An award of damages resulting from Calix's acts of infringement in accordance with 35 U.S.C. § 284;
- C. A judgment and order finding that Calix's infringement was willful, wanton, malicious, bad-faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate within the meaning of 35 U.S.C. § 284 and awarding to DIFF Scale Operation Research enhanced damages.
- D. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to DIFF Scale Operation Research their reasonable attorneys' fees against Calix.
- E. Any and all other relief to which DIFF Scale Operation Research may show

themselves to be entitled.

JURY TRIAL DEMANDED

Pursuant to Rule 38 of the Federal Rules of Civil Procedure, DIFF Scale Operation Research, LLC requests a trial by jury of any issues so triable by right.

Dated: March 8, 2018

Respectfully submitted,

/s/ Daniel P. Hipskind

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